AFLATOXIN CONTROL FOR IMPROVING HEALTH, AGRICULTURE, AND TRADE IN AFRICA

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World Bank HQ, Washington, DC

SUMMARY OF OUTCOMES AND NEXT STEPS

Introduction

The prevalence of aflatoxin in crops and livestock is a serious problem in many parts of the world, undermining public health and development efforts. Aflatoxins are highly toxic, cancer causing fungal metabolites known to cause immune-system suppression, growth retardation, liver disease, and death in both humans and domestic animals. According to the United Nations Food and Agriculture Organization (FAO), 25% of world food crops are affected, and countries that are situated between 40°N and 40°S are most at risk. Over 4.5 billion people in developing countries are at risk of chronic aflatoxin exposure (Williams, et al.). Unless aflatoxin levels in crops and livestock are effectively managed, international development efforts to achieve greater agricultural development, food security and improve health will be undermined, particularly in sub-Saharan Africa where contamination is widespread and often acute. Inexpensive, traditional post-harvest practices can reduce the level of contamination, and a new aflatoxin management technology in the form of a local beneficial technology, derived from native African micro-flora, has been developed to fight aflatoxin in the soil, where it begins. However, much work is needed to construct a comprehensive approach to effectively manage and eliminate aflatoxin.

A broad range of stakeholders¹ are exploring the creation of an Africa-led partnership to develop a comprehensive strategy to control aflatoxin contamination, focusing on entire value chains in order to ensure a holistic and integrated approach for aflatoxin control. The goals of a Partnership for Aflatoxin Control in Africa (PACA) would be to reduce the incidence of aflatoxin in food, improve public health, increase trade, augment smallholder income, and enhance food security in Africa. A process is currently underway to interview stakeholders from all sectors of society and to convene a series of meetings to raise awareness and seek input on the array of programs and activities needed for aflatoxin control in Africa, including a PACA. The Bill & Melinda Gates Foundation and the World Bank co-hosted an information session at the World Bank on 26 January 2011 to discuss these issues. The meeting was followed by a Funders’ Meeting in Brussels on March 2, 2011. These events are leading up to an aflatoxin discussion session, scheduled during the CAADP Partnership Platform meeting, 23-25 March 2011, in Cameroon.

Meeting Objectives

- Raise awareness of aflatoxin’s impact on health, agriculture and trade among World Bank participants, with an aim to add aflatoxin control to the priorities at the World Bank.
- Raise interest in aflatoxin control, encouraging World Bank engagement and investment in aflatoxin control solutions, as part of Agricultural Development efforts.
- Discuss progress towards creation of a Partnership for Aflatoxin Control in Africa.
- Help prepare African delegations for aflatoxin discussions during Comprehensive Africa Agriculture Development Programme Partnership Platform (CAADP PP) meeting in March to encourage maximum participation and progress.

¹ These organizations include funders, government agencies, research institutions, companies, and NGOs. Examples include: the Bill & Melinda Gates Foundation, USAID, USDA, African Union, COMESA, and The World Bank.
Morning Presentations

The meeting was opened by Mark Cackler, Sector Manager, Agriculture and Rural Development, World Bank and Prem Warrior, Senior Program Officer, Agricultural Development Program, Bill & Melinda Gates Foundation

Both speakers opened the meeting by discussing the close working relationship the World Bank and the Bill & Melinda Gates Foundation share on a number of important development areas. They stated that aflatoxin is a common concern for agri-business, governments, and the public, and thanked everyone for their commitment to this important issue. As illustrated by the current crisis in Kenya, aflatoxin mitigation efforts in Africa are needed now to improve health, crop management, and agricultural trade opportunities in Africa.

Dr. Sarah Olembo, Senior Policy Officer, Department of Rural Economy and Agriculture (AU-DREA) gave a statement on behalf of Dr. Rhoda Peace, African Union Commissioner for Rural Economy and Agriculture.

The AU views aflatoxin contamination as a key development and public health issue and reducing contamination is an emerging priority. One third of European Union agricultural trade regulations are mycotoxin related. Trade and economic development efforts are hurt when commodities are rejected because they do not meet safety standards. As of 2003, only fifteen African countries had adopted mycotoxin regulations; however, these regulations do not reach small farmers.

The AU proposed the following efforts to manage aflatoxin in Africa:

1. Include aflatoxin mitigation efforts in CAADP national investment programs.
2. Implement a full food safety program which includes training to inspect commodities, a mechanism for food to be withdrawn, awareness raising (particularly among women and rural poor), simple storage training, diversifying food production, and developing alternative uses for contaminated foods.

These opening statements were followed by the following presentations. The PowerPoint slides from these presentations are available at: http://www.agriskmanagementforum.org/farmd/content/meeting-aflatoxin-control-improving-health-agriculture-and-trade-africa-washington-dc-januar.

Overview of Aflatoxin Impacts on Health, Food Security, and Incomes

Dr. Peter Cotty, Senior Plant Pathologist, Agricultural Research Service, US Department of Agriculture, gave an overview of aflatoxin. Some of the key points included:

- Contamination occurs in two phases: before crop maturity in the soil, and after crop maturity, before and after harvest.
- The problem is worldwide, and is aggressively managed in the US.
- Contamination can vary from season to season and within a single crop. Even a single ear of corn can have varying degrees of toxicity. This variability requires sound sampling and training to interpret test results.
- Testing is challenging for various reasons; expensive, few labs, and training needed.
- Contaminated crops can have alternative uses, depending on the level of contamination. However, markets for contaminated products in Africa are needed.

Dr. Angelika Tritscher, World Health Organization Joint Secretary to JECFA and JMPR, Department of Food Safety and Zoonoses, gave a presentation on Aflatoxin, a Global Health Problem, some key points include:

- Human aflatoxin exposure in maize and groundnuts is highest when these foods are dietary staples, i.e., poor nations.
- Over 5 billion people in developing countries are at risk of aflatoxin exposure.
- Human health effects include: liver cancer; acute intoxication; immune system disorders; potentially stunted growth in children; liver cirrhosis.
- Health effects (often synergistic with infections, e.g. HBV) pervade in (sub-Saharan) Africa and East Asia.
- Over 100 nations have established maximum limits for aflatoxin in food, but this is of limited impact for small and subsistence farmers.
- It is a large health burden, which is under-diagnosed and under-reported. 40% of all liver cancer occurs in Africa, and it is estimated that of these, 5-30% is related to aflatoxin. It is believed that aflatoxin impacts stunting, but more research is needed.
- WHO has undertaken an initiative to estimate the global burden of food born diseases, including aflatoxin.
- Several interventions are required at various levels: food production and storage, education and public health.

Clare Narrod, Senior Research Fellow, Project Lead, Aflacontrol Project and Pippa Chenevix Trench, Research Fellow, Manager, Aflatoxin Control Project, International Food Policy Research Institute, presented on Trade and Economic Impacts: Prevalence, Perceptions and Practices based on their research in Kenya and Mali. Some key points include:

- IFPRI’s Gates Foundation funded study is collecting data on aflatoxin prevalence along maize and groundnut value chains, consumption, livelihood and behavioral indicators. With the data we are examining 1) the economic impact on livelihoods (health consequences, income, and trade), 2) developing a data base of aflatoxin prevalence as maize and groundnuts move through the value chain and how control measures alter that prevalence, 3) understanding value chain actors knowledge, attitude, perception and practices regarding aflatoxin control and understanding their willingness to pay for risk reduction strategies, 4) developing predictive risk maps, and 5) conducting a risk analysis (risk assessment and cost/benefit analysis) of control strategies.

- Some of the preliminary findings include:
  - Consumers-lack of knowledge about what aflatoxin is, its consequences, its origin and health effects;
  - Some stakeholders are aware about the consequences of contamination and exposure but knowledge about reducing risk has not been translated to action;
  - Lack of good understanding on effectiveness and efficiency (including costs and benefits) of risk reduction measures (most experimental); thus we are using hypothetical risk reduction measures
  - Lack of understanding consumption (via plate consumption study) and actual aflatoxin levels in blood (biomarker);
  - Lack of understanding how to ensure adoption of farmers if cost-effective measures are identified.

**Agricultural Development and Post-Harvest Losses**

John E. Lamb, Senior Agro-investment Strategy Advisor, Agriculture and Rural Development Department, The World Bank, Washington DC, relayed findings from his study on agricultural development and post-harvest losses, discussing why we need to better connect agricultural development to the aflatoxin issue.

- Global population will grow to 9.1 billion people by 2050, with urbanization expected to reach 70 percent. Food production will need to increase by 70 percent to meet the changing needs of a growing, increasingly urban population.
- Production increases for staples like rice and wheat are not keeping pace due to environmental events like flooding, drought, disease, pests, and competition for land and increased regulations in developed countries.
- Corn production has kept pace, but 75% of increase in global corn production from 2004-07 went for ethanol in the US.
- The focus on food security is not new, but the recognition of the need to connect all relevant fields is indeed new ("Policy-makers…need to recognize food as a unique class of commodity and adopt a broad
Reducing food losses is now on the agenda and intersects with various aspects of the pillars of food security: availability, access, utilization, stability. Aflatoxin is a supply chain management issue, and any lapse in the chain can lead to toxic food.

WB, NRI, and FAO conducted a study of post-harvest losses in sub-Saharan Africa. Areas to work on to reduce post-harvest losses include: better communication and learning regarding; post harvest issues and opportunities; better institutional arrangements for grain; marketing; better pest management; better postharvest grain management; better storage structures; and improving adoption and use.

A number of potential analogies between efforts to reduce post-harvest losses and reduce aflatoxin contamination need to be further explored.

**Biocontrol and Other Solutions: Addressing Aflatoxin in Sub-Saharan Africa**

Dr. Peter Cotty went over the range of current solutions available and explained the science behind the use of beneficial fungi for biocontrol. Biocontrol is the only solution that is effective in the soil, where aflatoxin contamination begins and carries through the value chain through storage and consumption.

Dr. Cotty showed compelling scientific data, both in the US and Nigeria that proves that the use of beneficial fungi is an available, proven, scientific solution that can be successfully adapted to local fields in Africa to reduce and manage aflatoxin. There are many indigenous beneficial atoxigenic strains of the fungus that can cause aflatoxin present in fields, and plant pathologists select atoxigenic strains best adapted to rotations, ecosystems, and climates. USDA-FAS and IITA are working in fields in several African countries to select the best local strains of beneficial fungi to use for biocontrol products.

**Treatments have long-term influences and cumulative benefits**
The beneficial native atoxigenic strains of the fungus multiply and dominate over the bad aflatoxin producing strains in the soil, making the positive effects on crops last for several seasons. This also means that more than one crop may benefit from the same strain.

IITA has begun work in several countries in Africa, but much remains to be done. Identifying strains is a continuous endeavor and testing the locally adapted biocontrol’s efficacy is critical and takes several seasons. Host government and donor support are needed to advance this work.

**Afternoon Discussion on the Elements of a Partnership for Aflatoxin Control**

**Current Gaps in Aflatoxin Control**

Arlene Mitchell of the Bill and Melinda Gates Foundation discussed current gaps in control that had not already been mentioned. The Foundation’s interest in aflatoxin arose from the P4P local purchase experience where two out of the first four purchases in Kenya were rejected due to contamination. When the Foundation looked further into it, they found a much larger problem affecting health, agriculture and trade.

Due to its complex nature and widespread impact, BMGF believes that a coordinated, African led, interdisciplinary approach is required to mitigate aflatoxin in four key areas:

- Agriculture, and food security;
- Health, nutrition, and food safety;
- Communications, advocacy, and political messaging;
- Commercialization

More needs to be spent on agriculture, and aflatoxin in particular, by donors and host Governments. According to the Chicago Council’s Global Agricultural Development Project, America’s official development assistance to agriculture in Africa declined approximately 85 percent from the mid-1980s to 2006. The United States is now spending twenty times as much on food aid in Africa as it is spending to help African farmers grow more of their own food.
Health, Nutrition and Food Safety; Improving Regulatory Environments
Because of the serious food safety risks, human exposure to aflatoxins is limited by regulations that prohibit the use of crops containing excess quantities of aflatoxins for foods and feeds (in the EU, US and elsewhere). But, according to FAO, only 15 African countries had regulatory limits for aflatoxins as of 2003. However, even in countries with regulations, food that does not move through formal market channels e.g., almost all food sold in local markets, is effectively unregulated.

And, often where it is regulated, aflatoxin contamination is generally not appropriately controlled in developing countries unless the product is exported. As a result, millions of people living in sub-Saharan Africa are chronically exposed to high levels of aflatoxins through diet. Data on aflatoxin’s impact on human health is lacking in some areas, however we have more data for its impact on livestock.

Diagnostics
The Gates Foundation is investing in cheaper, simple diagnostics for farmers so that they can test quickly at the field level, but this is in the initial development stages.

At present, there are few labs that can test for aflatoxin. Tests therefore have to be sent to labs from the field to Regional Hubs, London or elsewhere, which is time consuming and delays results for days. If you are an NGO working with small farmers in rural areas, the knowledge and resources needed, delays and other various complications can make testing for aflatoxin difficult and expensive.

Trade
How do standards and lack of testing translate to trade barriers? If commodities are contaminated, there is a serious loss in confidence, and commercial traders or importers will look to reliable sources of safe food.

Communications, advocacy, and political messaging
Communicating food safety issues to consumers can be tricky. Control measures need to be worked on in conjunction with data collection and awareness efforts. Public awareness strategies are important and delicate. (People are quite possibly eating toxic matter, but they don’t have any way to test or to buy alternatives, so how do you inform them?) What are the pros and cons of informing people vs. working quietly on the control measures, so that solutions are seen as possible before the health implications are spelled out? Is it better to treat aflatoxin as a health issue or an agriculture issue, or both, or other issue? (In Africa, it’s mostly been treated as a cash crop/international trade issue)

Even for solutions that are available, these solutions lack commercially viable options, because often food from small farmers is locally consumed. Biocontrol is one example, but there are others.

In response to queries, Ms. Mitchell expressed that the Foundation will focus on both existing technologies (available now), and new innovative solutions like diagnostics, storage and beneficial fungi (solutions being developed) because any hiccup in the value chain affects food safety. The beneficial fungi technology is promising because it works at the source, in the soil on the farm. If there are other solutions, the Foundation would like to add it to the tool kit and share with farmers. A participant added that moisture management technologies can be useful and can benefit other mycotoxins and molds. IFPRI indicated that their work will look at all mitigation methods to determine which ones people are likely to adapt.

A discussion on potential elements of a Partnership for Aflatoxin Control in Africa (PACA) followed, which led to discussion on the potential form of a PACA.

Discussion
It was agreed that there is a gap with regard to the magnitude of the problem and actions taken to mitigate it. There is an added value to a PACA to coordinate and communicate efforts, and several participants such as CIRAD, NGOs, the Private Sector and others expressed their interest in joining the public/private PACA effort, to help move things forward.
A coordinated effort is needed at the policy level, as well. AU and CAADP can take the lead. Evidence-based research on the economic impact, development, production and health are needed along with simple best practices. The AU indicated that Country Investment Plans should include food safety issues, including aflatoxin. Templates for these plans could be created.

A systematic approach is needed that should be jointly defined by the different interests that should play a role in the solution (economic, trade, health, environment). Using commodity specific approaches for maize, sorghum, and peanuts for instance, through those specific value chains might be useful, as is looking at addressing aflatoxin at the choke points. One could present incentives and disincentives to hammer mill operators, or beer manufacturers (a choke point for grain and sorghum) to effect change.

Participants observed that aid currently focuses on agricultural production, but development in agriculture needs to be market driven. Ideally, as an incentive, the market should drive the adoption of aflatoxin mitigation efforts, and pay a premium of 10-15% for safe commodities.

The efforts by local and regional purchase programs are designed to do this. For instance, the Gates Foundation is focused on grain, and is partnering with WFP, the largest grain purchaser in Africa. Farmers responded quickly when their production was rejected by P4P. The other large purchasers of grain are home grown school feeding programs. The public education efforts could be focused on public education through schools in countries like Ghana, Nigeria, Mali, Malawi and Senegal. Participants agreed that Home Grown School Feeding initiatives are a good way to connect.

Part of the discussion focused on the need for more evidence to prove the link between stunting and aflatoxin. Some participants felt that stronger evidence for this link would make the case for investing in solutions for aflatoxin contamination more compelling. IITA conducted a study on a relatively small sample of children in West Africa which showed a clear link between the two. They found that stunting had no economic correlation, and that the risk of stunting increased when more groundnuts were consumed. All children surveyed had aflatoxin in their blood and there were very high levels evident in stores. However, several participants felt that stronger evidence on stunting (and nutrition) is needed.

Karen Brooks, Sector Manager for the Agriculture & Rural Development Department, Africa Region at the World Bank made the following observations;

- There are US$ 1 Billion in new commitments for agriculture.
- Aflatoxin needs to be put into perspective with other priorities. Clarifying the stunting link could be important. What’s needed are numbers on costs and impact so that aflatoxin can be ranked to accord it the appropriate attention.
- Incentives: regulatory approach and export opportunities: If trade is regional, it’s difficult to enforce regulations. If it’s local trade, a public education approach is needed along with cost effective interventions to manage it. There are two avenues; soil management and land management.
- The beneficial fungi technology seems to be an exciting option. Significant impact which can be scaled up.
- Another avenue is extension services which are already underway, which can complement these efforts.
- An agriculture technology push can be effective because aflatoxin is more actionable than post harvest management.

Participants discussed that this issue is not like H1N1, and we need to look at it conversely. If it’s a public health issue, then we need education. The hot spots need to be identified and work needs to be done on the supply side to tackle the problem at the hot spot. There appears to be no incentive for the small holder, so public funds should be used because it’s in the public domain, but we need numbers. On the technology side, we need to test products over two years and figure out what this will cost, although it was noted that it’s difficult to identify hot spots because contamination is so pervasive.

CAADP can be viewed as an advocacy opportunity to link aflatoxin to agriculture and show that it’s a cross cutting issue affecting each of the four pillars. The group working on the PACA should build out these links to all four pillars, i.e. biocontrol is linked to both pillar I, land and water and pillar IV, agriculture technology. This will affect
the PACA’s agenda and a coalition will be eager to work on getting this topic on the agenda as a priority. CAADP should be part of the PACA structure and experts from pillars should participate. On the structure that this might take, the AU may want to embed aflatoxin mitigation in an ongoing activity.

A good public goods case can be made in Kenya. There, the food reserves are poorly managed and it costs more to burn the affected grain than the grain is worth.

Meridian summarized some of the procedural discussions on the partnership as follows:

- The PACA should be Africa-led, and should not over reach.
- Make it simple, not complex.
- Put together PACA concept note for comment.
- Support needs to be given to partners working on local and regional purchase with small farmers.

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<th>Suggested next steps</th>
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<td>3. Insert aflatoxin mitigation efforts into CAADP development programs.</td>
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<td>4. Develop Country Investment Plan “templates” to facilitate the addition of SPS and aflatoxin issues into country CAADP plans.</td>
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<td>5. Work towards implementing a full food safety program which includes training to inspect commodities, a mechanism for food to be withdrawn, awareness, particularly among women and rural poor, simple storage training, diversifying food production, and developing alternative uses for contaminated foods.</td>
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<td>6. Coordinate communications efforts: In the absence of human health data, share existing livestock data which covers the last eighty years. Think about ways to address the gap with regard to the magnitude of the problem and what was being done to mitigate it.</td>
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<td>7. Obtain evidence based research on the economic impact of aflatoxin on trade, agriculture and health.</td>
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<td>8. Look at commodity specific approaches (maize, sorghum, and peanuts) through those specific value chains to obtain concrete data and implement mitigation activities.</td>
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<td>11. Follow-up with the World Bank and the private sector on their interest on activities to control aflatoxin in Nigeria.</td>
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<td>12. Make a “public goods” case for Kenya.</td>
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